

STA_445_Assignment_6

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```
library(tidyverse)
library(lubridate)
```

Problem 1

Convert the following to date or date/time objects.

a. September 13, 2010.

```
mdy('September 13, 2010')
```

```
## [1] "2010-09-13"
```

b. Sept 13, 2010.

```
mdy('Sept 13, 2010')
```

```
## Warning: All formats failed to parse. No formats found.
```

```
## [1] NA
```

c. Sep 13, 2010.

```
mdy('Sep 13, 2010')
```

```
## [1] "2010-09-13"
```

d. S 13, 2010. Comment on the month abbreviation needs.

#The month needs the correct abbreviation, for September only Sep works as an abbreviation.

```
mdy('S 13, 2010')
```

```
## Warning: All formats failed to parse. No formats found.
```

```
## [1] NA
```

e. 07-Dec-1941.

```
dmy('07-Dec-1941')
```

```
## [1] "1941-12-07"
```

f. 1-5-1998. Comment on why you might be wrong.

#1 and 5 could both be the month or day, so this is either May first or January fifth. I went with May first.

```
dmy('1-5-1998')
```

```
## [1] "1998-05-01"
```

g. 21-5-1998. Comment on why you know you are correct.

#21 can't be the month and 1998 has to be the year, so this is May 21.

```
dmy('21-5-1998')
```

```
## [1] "1998-05-21"
```

h. 2020-May-5 10:30 am

```
ymd_hm('2020-May-5 10:30 am')
```

```
## [1] "2020-05-05 10:30:00 UTC"
```

i. 2020-May-5 10:30 am PDT (ex Seattle)

```
ymd_hm('2020-May-5 10:30 am', tz = 'US/Pacific')
```

```
## [1] "2020-05-05 10:30:00 PDT"
```

j. 2020-May-5 10:30 am AST (ex Puerto Rico)

```
ymd_hm('2020-May-5 10:30 am', tz = 'Atlantic/Bermuda')
```

```
## [1] "2020-05-05 10:30:00 ADT"
```

Problem 2

Using just your date of birth (ex Sep 7, 1998) and today's date calculate the following:

```
bday <- mdy_hm('12-28-2003 12:30pm', tz = 'US/Arizona')
current <- mdy_hm('03-26-2024 3:00pm', tz = 'US/Arizona')
bday
```

```
## [1] "2003-12-28 12:30:00 MST"
```

```
current
```

```
## [1] "2024-03-26 15:00:00 MST"
```

a. Calculate the date of your 64th birthday.

```
bday + years(64)
```

```
## [1] "2067-12-28 12:30:00 MST"
```

b. Calculate your current age (in years).

```
year(as.period(interval(bday, current)))
```

```
## [1] 20
```

c. Using your result in part (b), calculate the date of your next birthday.

```
Nextbday <- bday + years(20) + years(1)
Nextbday
```

```
## [1] "2024-12-28 12:30:00 MST"
```

d. The number of *days* until your next birthday.

```
as.period(interval(current, Nextbday), unit = 'days')
```

```
## [1] "276d 21H 30M 0S"
```

e. The number of *months* and *days* until your next birthday.

```
as.period(interval(current, Nextbday))
```

```
## [1] "9m 1d 21H 30M 0S"
```

Problem 3

Suppose you have arranged for a phone call to be at 3 pm on May 8, 2015 at Arizona time. However, the recipient will be in Auckland, NZ. What time will it be there?

```
with_tz(mdy_hm('05-08-2015 3:00 pm', tz = 'US/Arizona'), tzone = 'Pacific/Auckland')
```

```
## [1] "2015-05-09 10:00:00 NZST"
```

Problem 4

It turns out there is some interesting periodicity regarding the number of births on particular days of the year.

- a. Using the `mosaicData` package, load the data set `Births78` which records the number of children born on each day in the United States in 1978. Because this problem is intended to show how to calculate the information using the `date`, remove all the columns *except* `date` and `births`.

```
library(mosaicData)
data(Births78)
Births78 <- Births78 %>%
  select('date', 'births')
Births78
```

##	date	births
## 1	1978-01-01	7701
## 2	1978-01-02	7527
## 3	1978-01-03	8825
## 4	1978-01-04	8859
## 5	1978-01-05	9043
## 6	1978-01-06	9208
## 7	1978-01-07	8084
## 8	1978-01-08	7611
## 9	1978-01-09	9172
## 10	1978-01-10	9089
## 11	1978-01-11	9210
## 12	1978-01-12	9259
## 13	1978-01-13	9138
## 14	1978-01-14	8299
## 15	1978-01-15	7771
## 16	1978-01-16	9458
## 17	1978-01-17	9339
## 18	1978-01-18	9120
## 19	1978-01-19	9226
## 20	1978-01-20	9305
## 21	1978-01-21	7954
## 22	1978-01-22	7560
## 23	1978-01-23	9252
## 24	1978-01-24	9416
## 25	1978-01-25	9090
## 26	1978-01-26	9387
## 27	1978-01-27	8983
## 28	1978-01-28	7946
## 29	1978-01-29	7527
## 30	1978-01-30	9184
## 31	1978-01-31	9152
## 32	1978-02-01	9159
## 33	1978-02-02	9218
## 34	1978-02-03	9167
## 35	1978-02-04	8065
## 36	1978-02-05	7804
## 37	1978-02-06	9225

##	38	1978-02-07	9328
##	39	1978-02-08	9139
##	40	1978-02-09	9247
##	41	1978-02-10	9527
##	42	1978-02-11	8144
##	43	1978-02-12	7950
##	44	1978-02-13	8966
##	45	1978-02-14	9859
##	46	1978-02-15	9285
##	47	1978-02-16	9103
##	48	1978-02-17	9238
##	49	1978-02-18	8167
##	50	1978-02-19	7695
##	51	1978-02-20	9021
##	52	1978-02-21	9252
##	53	1978-02-22	9335
##	54	1978-02-23	9268
##	55	1978-02-24	9552
##	56	1978-02-25	8313
##	57	1978-02-26	7881
##	58	1978-02-27	9262
##	59	1978-02-28	9705
##	60	1978-03-01	9132
##	61	1978-03-02	9304
##	62	1978-03-03	9431
##	63	1978-03-04	8008
##	64	1978-03-05	7791
##	65	1978-03-06	9294
##	66	1978-03-07	9573
##	67	1978-03-08	9212
##	68	1978-03-09	9218
##	69	1978-03-10	9583
##	70	1978-03-11	8144
##	71	1978-03-12	7870
##	72	1978-03-13	9022
##	73	1978-03-14	9525
##	74	1978-03-15	9284
##	75	1978-03-16	9327
##	76	1978-03-17	9480
##	77	1978-03-18	7965
##	78	1978-03-19	7729
##	79	1978-03-20	9135
##	80	1978-03-21	9663
##	81	1978-03-22	9307
##	82	1978-03-23	9159
##	83	1978-03-24	9157
##	84	1978-03-25	7874
##	85	1978-03-26	7589
##	86	1978-03-27	9100
##	87	1978-03-28	9293
##	88	1978-03-29	9195
##	89	1978-03-30	8902
##	90	1978-03-31	9318
##	91	1978-04-01	8069

##	92	1978-04-02	7691
##	93	1978-04-03	9114
##	94	1978-04-04	9439
##	95	1978-04-05	8852
##	96	1978-04-06	8969
##	97	1978-04-07	9077
##	98	1978-04-08	7890
##	99	1978-04-09	7445
##	100	1978-04-10	8870
##	101	1978-04-11	9023
##	102	1978-04-12	8606
##	103	1978-04-13	8724
##	104	1978-04-14	9012
##	105	1978-04-15	7527
##	106	1978-04-16	7193
##	107	1978-04-17	8702
##	108	1978-04-18	9205
##	109	1978-04-19	8720
##	110	1978-04-20	8582
##	111	1978-04-21	8892
##	112	1978-04-22	7787
##	113	1978-04-23	7304
##	114	1978-04-24	9017
##	115	1978-04-25	9077
##	116	1978-04-26	9019
##	117	1978-04-27	8839
##	118	1978-04-28	9047
##	119	1978-04-29	7750
##	120	1978-04-30	7135
##	121	1978-05-01	8900
##	122	1978-05-02	9422
##	123	1978-05-03	9051
##	124	1978-05-04	8672
##	125	1978-05-05	9101
##	126	1978-05-06	7718
##	127	1978-05-07	7388
##	128	1978-05-08	8987
##	129	1978-05-09	9307
##	130	1978-05-10	9273
##	131	1978-05-11	8903
##	132	1978-05-12	8975
##	133	1978-05-13	7762
##	134	1978-05-14	7382
##	135	1978-05-15	9195
##	136	1978-05-16	9200
##	137	1978-05-17	8913
##	138	1978-05-18	9044
##	139	1978-05-19	9000
##	140	1978-05-20	8064
##	141	1978-05-21	7570
##	142	1978-05-22	9089
##	143	1978-05-23	9210
##	144	1978-05-24	9196
##	145	1978-05-25	9180

##	146	1978-05-26	9514
##	147	1978-05-27	8005
##	148	1978-05-28	7781
##	149	1978-05-29	7780
##	150	1978-05-30	9630
##	151	1978-05-31	9600
##	152	1978-06-01	9435
##	153	1978-06-02	9303
##	154	1978-06-03	7971
##	155	1978-06-04	7399
##	156	1978-06-05	9127
##	157	1978-06-06	9606
##	158	1978-06-07	9328
##	159	1978-06-08	9075
##	160	1978-06-09	9362
##	161	1978-06-10	8040
##	162	1978-06-11	7581
##	163	1978-06-12	9201
##	164	1978-06-13	9264
##	165	1978-06-14	9216
##	166	1978-06-15	9175
##	167	1978-06-16	9350
##	168	1978-06-17	8233
##	169	1978-06-18	7777
##	170	1978-06-19	9543
##	171	1978-06-20	9672
##	172	1978-06-21	9266
##	173	1978-06-22	9405
##	174	1978-06-23	9598
##	175	1978-06-24	8122
##	176	1978-06-25	8091
##	177	1978-06-26	9348
##	178	1978-06-27	9857
##	179	1978-06-28	9701
##	180	1978-06-29	9630
##	181	1978-06-30	10080
##	182	1978-07-01	8209
##	183	1978-07-02	7976
##	184	1978-07-03	9284
##	185	1978-07-04	8433
##	186	1978-07-05	9675
##	187	1978-07-06	10184
##	188	1978-07-07	10241
##	189	1978-07-08	8773
##	190	1978-07-09	8102
##	191	1978-07-10	9877
##	192	1978-07-11	9852
##	193	1978-07-12	9705
##	194	1978-07-13	9984
##	195	1978-07-14	10438
##	196	1978-07-15	8859
##	197	1978-07-16	8416
##	198	1978-07-17	10026
##	199	1978-07-18	10357

##	200	1978-07-19	10015
##	201	1978-07-20	10386
##	202	1978-07-21	10332
##	203	1978-07-22	9062
##	204	1978-07-23	8563
##	205	1978-07-24	9960
##	206	1978-07-25	10349
##	207	1978-07-26	10091
##	208	1978-07-27	10192
##	209	1978-07-28	10307
##	210	1978-07-29	8677
##	211	1978-07-30	8486
##	212	1978-07-31	9890
##	213	1978-08-01	10145
##	214	1978-08-02	9824
##	215	1978-08-03	10128
##	216	1978-08-04	10051
##	217	1978-08-05	8738
##	218	1978-08-06	8442
##	219	1978-08-07	10206
##	220	1978-08-08	10442
##	221	1978-08-09	10142
##	222	1978-08-10	10284
##	223	1978-08-11	10162
##	224	1978-08-12	8951
##	225	1978-08-13	8532
##	226	1978-08-14	10127
##	227	1978-08-15	10502
##	228	1978-08-16	10053
##	229	1978-08-17	10377
##	230	1978-08-18	10355
##	231	1978-08-19	8904
##	232	1978-08-20	8477
##	233	1978-08-21	9967
##	234	1978-08-22	10229
##	235	1978-08-23	9900
##	236	1978-08-24	10152
##	237	1978-08-25	10173
##	238	1978-08-26	8782
##	239	1978-08-27	8453
##	240	1978-08-28	9998
##	241	1978-08-29	10387
##	242	1978-08-30	10063
##	243	1978-08-31	9849
##	244	1978-09-01	10114
##	245	1978-09-02	8580
##	246	1978-09-03	8355
##	247	1978-09-04	8481
##	248	1978-09-05	10023
##	249	1978-09-06	10703
##	250	1978-09-07	10292
##	251	1978-09-08	10371
##	252	1978-09-09	9023
##	253	1978-09-10	8630

##	254	1978-09-11	10154
##	255	1978-09-12	10425
##	256	1978-09-13	10149
##	257	1978-09-14	10265
##	258	1978-09-15	10265
##	259	1978-09-16	9170
##	260	1978-09-17	8711
##	261	1978-09-18	10304
##	262	1978-09-19	10711
##	263	1978-09-20	10488
##	264	1978-09-21	10499
##	265	1978-09-22	10349
##	266	1978-09-23	8735
##	267	1978-09-24	8647
##	268	1978-09-25	10414
##	269	1978-09-26	10498
##	270	1978-09-27	10344
##	271	1978-09-28	10175
##	272	1978-09-29	10368
##	273	1978-09-30	8648
##	274	1978-10-01	8686
##	275	1978-10-02	9927
##	276	1978-10-03	10378
##	277	1978-10-04	9928
##	278	1978-10-05	9949
##	279	1978-10-06	10052
##	280	1978-10-07	8605
##	281	1978-10-08	8377
##	282	1978-10-09	9765
##	283	1978-10-10	10351
##	284	1978-10-11	9873
##	285	1978-10-12	9824
##	286	1978-10-13	9755
##	287	1978-10-14	8554
##	288	1978-10-15	7873
##	289	1978-10-16	9531
##	290	1978-10-17	9938
##	291	1978-10-18	9388
##	292	1978-10-19	9502
##	293	1978-10-20	9625
##	294	1978-10-21	8411
##	295	1978-10-22	7936
##	296	1978-10-23	9425
##	297	1978-10-24	9576
##	298	1978-10-25	9328
##	299	1978-10-26	9501
##	300	1978-10-27	9537
##	301	1978-10-28	8415
##	302	1978-10-29	8155
##	303	1978-10-30	9457
##	304	1978-10-31	9333
##	305	1978-11-01	9321
##	306	1978-11-02	9245
##	307	1978-11-03	9774

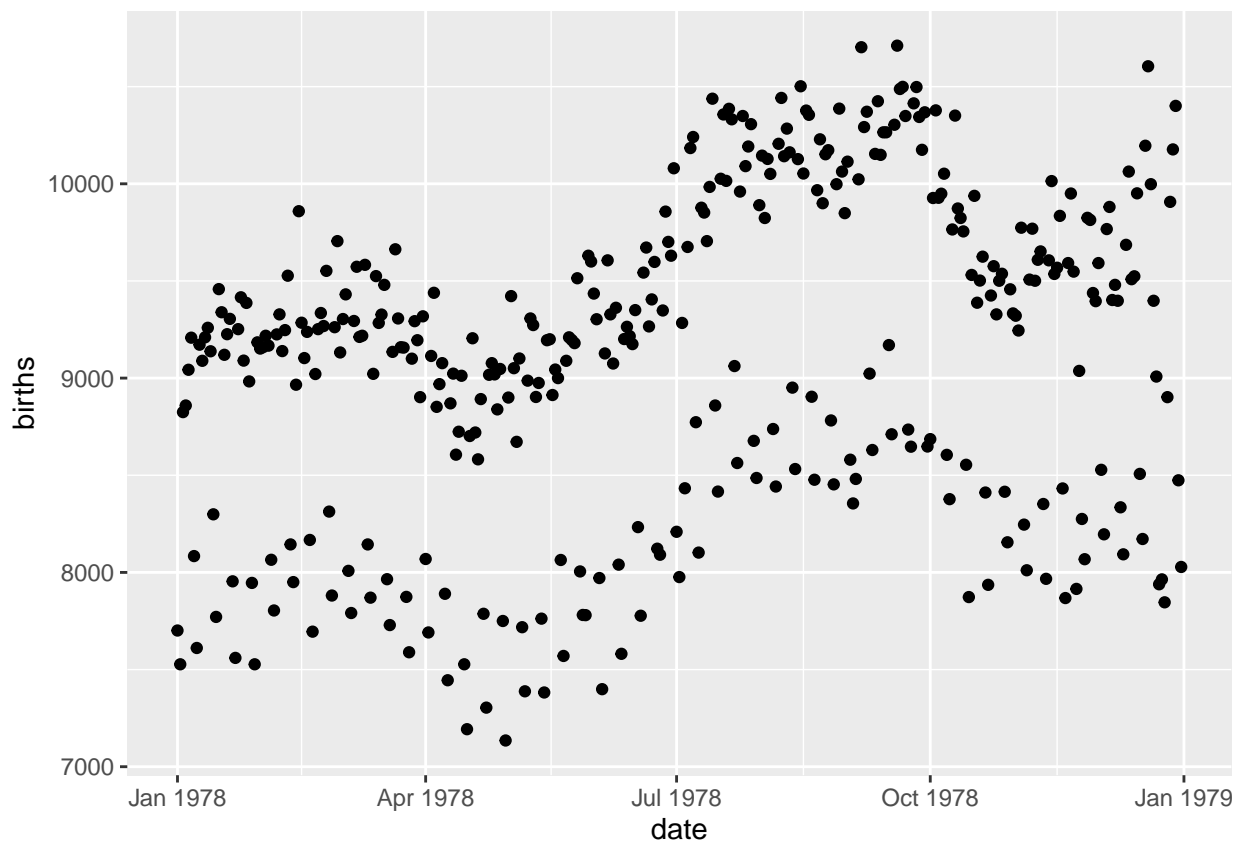
##	308	1978-11-04	8246
##	309	1978-11-05	8011
##	310	1978-11-06	9507
##	311	1978-11-07	9769
##	312	1978-11-08	9501
##	313	1978-11-09	9609
##	314	1978-11-10	9652
##	315	1978-11-11	8352
##	316	1978-11-12	7967
##	317	1978-11-13	9606
##	318	1978-11-14	10014
##	319	1978-11-15	9536
##	320	1978-11-16	9568
##	321	1978-11-17	9835
##	322	1978-11-18	8432
##	323	1978-11-19	7868
##	324	1978-11-20	9592
##	325	1978-11-21	9950
##	326	1978-11-22	9548
##	327	1978-11-23	7915
##	328	1978-11-24	9037
##	329	1978-11-25	8275
##	330	1978-11-26	8068
##	331	1978-11-27	9825
##	332	1978-11-28	9814
##	333	1978-11-29	9438
##	334	1978-11-30	9396
##	335	1978-12-01	9592
##	336	1978-12-02	8528
##	337	1978-12-03	8196
##	338	1978-12-04	9767
##	339	1978-12-05	9881
##	340	1978-12-06	9402
##	341	1978-12-07	9480
##	342	1978-12-08	9398
##	343	1978-12-09	8335
##	344	1978-12-10	8093
##	345	1978-12-11	9686
##	346	1978-12-12	10063
##	347	1978-12-13	9509
##	348	1978-12-14	9524
##	349	1978-12-15	9951
##	350	1978-12-16	8507
##	351	1978-12-17	8172
##	352	1978-12-18	10196
##	353	1978-12-19	10605
##	354	1978-12-20	9998
##	355	1978-12-21	9398
##	356	1978-12-22	9008
##	357	1978-12-23	7939
##	358	1978-12-24	7964
##	359	1978-12-25	7846
##	360	1978-12-26	8902
##	361	1978-12-27	9907

```
## 362 1978-12-28 10177
## 363 1978-12-29 10401
## 364 1978-12-30 8474
## 365 1978-12-31 8028
```

- b. Graph the number of `births` vs the `date` with date on the x-axis. What stands out to you? Why do you think we have this trend?

#There are more births around August and September than the rest of the year, maybe because the holiday season is 9 months before. There is also a space between clusters of dots in each month, probably for day of the week.

```
Births78 %>%
  ggplot(aes(x=date, y=births)) +
  geom_point()
```



- c. To test your assumption, we need to figure out the what day of the week each observation is. Use `dplyr::mutate` to add a new column named `dow` that is the day of the week (Monday, Tuesday, etc). This calculation will involve some function in the `lubridate` package and the `date` column.

```
Births78 <- Births78 %>%
  dplyr::mutate('dow' = wday(date, label=TRUE))
Births78
```

##		date	births	dow
## 1		1978-01-01	7701	Sun
## 2		1978-01-02	7527	Mon
## 3		1978-01-03	8825	Tue
## 4		1978-01-04	8859	Wed
## 5		1978-01-05	9043	Thu
## 6		1978-01-06	9208	Fri
## 7		1978-01-07	8084	Sat
## 8		1978-01-08	7611	Sun
## 9		1978-01-09	9172	Mon
## 10		1978-01-10	9089	Tue
## 11		1978-01-11	9210	Wed
## 12		1978-01-12	9259	Thu
## 13		1978-01-13	9138	Fri
## 14		1978-01-14	8299	Sat
## 15		1978-01-15	7771	Sun
## 16		1978-01-16	9458	Mon
## 17		1978-01-17	9339	Tue
## 18		1978-01-18	9120	Wed
## 19		1978-01-19	9226	Thu
## 20		1978-01-20	9305	Fri
## 21		1978-01-21	7954	Sat
## 22		1978-01-22	7560	Sun
## 23		1978-01-23	9252	Mon
## 24		1978-01-24	9416	Tue
## 25		1978-01-25	9090	Wed
## 26		1978-01-26	9387	Thu
## 27		1978-01-27	8983	Fri
## 28		1978-01-28	7946	Sat
## 29		1978-01-29	7527	Sun
## 30		1978-01-30	9184	Mon
## 31		1978-01-31	9152	Tue
## 32		1978-02-01	9159	Wed
## 33		1978-02-02	9218	Thu
## 34		1978-02-03	9167	Fri
## 35		1978-02-04	8065	Sat
## 36		1978-02-05	7804	Sun
## 37		1978-02-06	9225	Mon
## 38		1978-02-07	9328	Tue
## 39		1978-02-08	9139	Wed
## 40		1978-02-09	9247	Thu
## 41		1978-02-10	9527	Fri
## 42		1978-02-11	8144	Sat
## 43		1978-02-12	7950	Sun
## 44		1978-02-13	8966	Mon
## 45		1978-02-14	9859	Tue
## 46		1978-02-15	9285	Wed
## 47		1978-02-16	9103	Thu
## 48		1978-02-17	9238	Fri
## 49		1978-02-18	8167	Sat
## 50		1978-02-19	7695	Sun
## 51		1978-02-20	9021	Mon
## 52		1978-02-21	9252	Tue
## 53		1978-02-22	9335	Wed

## 54	1978-02-23	9268	Thu
## 55	1978-02-24	9552	Fri
## 56	1978-02-25	8313	Sat
## 57	1978-02-26	7881	Sun
## 58	1978-02-27	9262	Mon
## 59	1978-02-28	9705	Tue
## 60	1978-03-01	9132	Wed
## 61	1978-03-02	9304	Thu
## 62	1978-03-03	9431	Fri
## 63	1978-03-04	8008	Sat
## 64	1978-03-05	7791	Sun
## 65	1978-03-06	9294	Mon
## 66	1978-03-07	9573	Tue
## 67	1978-03-08	9212	Wed
## 68	1978-03-09	9218	Thu
## 69	1978-03-10	9583	Fri
## 70	1978-03-11	8144	Sat
## 71	1978-03-12	7870	Sun
## 72	1978-03-13	9022	Mon
## 73	1978-03-14	9525	Tue
## 74	1978-03-15	9284	Wed
## 75	1978-03-16	9327	Thu
## 76	1978-03-17	9480	Fri
## 77	1978-03-18	7965	Sat
## 78	1978-03-19	7729	Sun
## 79	1978-03-20	9135	Mon
## 80	1978-03-21	9663	Tue
## 81	1978-03-22	9307	Wed
## 82	1978-03-23	9159	Thu
## 83	1978-03-24	9157	Fri
## 84	1978-03-25	7874	Sat
## 85	1978-03-26	7589	Sun
## 86	1978-03-27	9100	Mon
## 87	1978-03-28	9293	Tue
## 88	1978-03-29	9195	Wed
## 89	1978-03-30	8902	Thu
## 90	1978-03-31	9318	Fri
## 91	1978-04-01	8069	Sat
## 92	1978-04-02	7691	Sun
## 93	1978-04-03	9114	Mon
## 94	1978-04-04	9439	Tue
## 95	1978-04-05	8852	Wed
## 96	1978-04-06	8969	Thu
## 97	1978-04-07	9077	Fri
## 98	1978-04-08	7890	Sat
## 99	1978-04-09	7445	Sun
## 100	1978-04-10	8870	Mon
## 101	1978-04-11	9023	Tue
## 102	1978-04-12	8606	Wed
## 103	1978-04-13	8724	Thu
## 104	1978-04-14	9012	Fri
## 105	1978-04-15	7527	Sat
## 106	1978-04-16	7193	Sun
## 107	1978-04-17	8702	Mon

##	108	1978-04-18	9205	Tue
##	109	1978-04-19	8720	Wed
##	110	1978-04-20	8582	Thu
##	111	1978-04-21	8892	Fri
##	112	1978-04-22	7787	Sat
##	113	1978-04-23	7304	Sun
##	114	1978-04-24	9017	Mon
##	115	1978-04-25	9077	Tue
##	116	1978-04-26	9019	Wed
##	117	1978-04-27	8839	Thu
##	118	1978-04-28	9047	Fri
##	119	1978-04-29	7750	Sat
##	120	1978-04-30	7135	Sun
##	121	1978-05-01	8900	Mon
##	122	1978-05-02	9422	Tue
##	123	1978-05-03	9051	Wed
##	124	1978-05-04	8672	Thu
##	125	1978-05-05	9101	Fri
##	126	1978-05-06	7718	Sat
##	127	1978-05-07	7388	Sun
##	128	1978-05-08	8987	Mon
##	129	1978-05-09	9307	Tue
##	130	1978-05-10	9273	Wed
##	131	1978-05-11	8903	Thu
##	132	1978-05-12	8975	Fri
##	133	1978-05-13	7762	Sat
##	134	1978-05-14	7382	Sun
##	135	1978-05-15	9195	Mon
##	136	1978-05-16	9200	Tue
##	137	1978-05-17	8913	Wed
##	138	1978-05-18	9044	Thu
##	139	1978-05-19	9000	Fri
##	140	1978-05-20	8064	Sat
##	141	1978-05-21	7570	Sun
##	142	1978-05-22	9089	Mon
##	143	1978-05-23	9210	Tue
##	144	1978-05-24	9196	Wed
##	145	1978-05-25	9180	Thu
##	146	1978-05-26	9514	Fri
##	147	1978-05-27	8005	Sat
##	148	1978-05-28	7781	Sun
##	149	1978-05-29	7780	Mon
##	150	1978-05-30	9630	Tue
##	151	1978-05-31	9600	Wed
##	152	1978-06-01	9435	Thu
##	153	1978-06-02	9303	Fri
##	154	1978-06-03	7971	Sat
##	155	1978-06-04	7399	Sun
##	156	1978-06-05	9127	Mon
##	157	1978-06-06	9606	Tue
##	158	1978-06-07	9328	Wed
##	159	1978-06-08	9075	Thu
##	160	1978-06-09	9362	Fri
##	161	1978-06-10	8040	Sat

##	162	1978-06-11	7581	Sun
##	163	1978-06-12	9201	Mon
##	164	1978-06-13	9264	Tue
##	165	1978-06-14	9216	Wed
##	166	1978-06-15	9175	Thu
##	167	1978-06-16	9350	Fri
##	168	1978-06-17	8233	Sat
##	169	1978-06-18	7777	Sun
##	170	1978-06-19	9543	Mon
##	171	1978-06-20	9672	Tue
##	172	1978-06-21	9266	Wed
##	173	1978-06-22	9405	Thu
##	174	1978-06-23	9598	Fri
##	175	1978-06-24	8122	Sat
##	176	1978-06-25	8091	Sun
##	177	1978-06-26	9348	Mon
##	178	1978-06-27	9857	Tue
##	179	1978-06-28	9701	Wed
##	180	1978-06-29	9630	Thu
##	181	1978-06-30	10080	Fri
##	182	1978-07-01	8209	Sat
##	183	1978-07-02	7976	Sun
##	184	1978-07-03	9284	Mon
##	185	1978-07-04	8433	Tue
##	186	1978-07-05	9675	Wed
##	187	1978-07-06	10184	Thu
##	188	1978-07-07	10241	Fri
##	189	1978-07-08	8773	Sat
##	190	1978-07-09	8102	Sun
##	191	1978-07-10	9877	Mon
##	192	1978-07-11	9852	Tue
##	193	1978-07-12	9705	Wed
##	194	1978-07-13	9984	Thu
##	195	1978-07-14	10438	Fri
##	196	1978-07-15	8859	Sat
##	197	1978-07-16	8416	Sun
##	198	1978-07-17	10026	Mon
##	199	1978-07-18	10357	Tue
##	200	1978-07-19	10015	Wed
##	201	1978-07-20	10386	Thu
##	202	1978-07-21	10332	Fri
##	203	1978-07-22	9062	Sat
##	204	1978-07-23	8563	Sun
##	205	1978-07-24	9960	Mon
##	206	1978-07-25	10349	Tue
##	207	1978-07-26	10091	Wed
##	208	1978-07-27	10192	Thu
##	209	1978-07-28	10307	Fri
##	210	1978-07-29	8677	Sat
##	211	1978-07-30	8486	Sun
##	212	1978-07-31	9890	Mon
##	213	1978-08-01	10145	Tue
##	214	1978-08-02	9824	Wed
##	215	1978-08-03	10128	Thu

##	216	1978-08-04	10051	Fri
##	217	1978-08-05	8738	Sat
##	218	1978-08-06	8442	Sun
##	219	1978-08-07	10206	Mon
##	220	1978-08-08	10442	Tue
##	221	1978-08-09	10142	Wed
##	222	1978-08-10	10284	Thu
##	223	1978-08-11	10162	Fri
##	224	1978-08-12	8951	Sat
##	225	1978-08-13	8532	Sun
##	226	1978-08-14	10127	Mon
##	227	1978-08-15	10502	Tue
##	228	1978-08-16	10053	Wed
##	229	1978-08-17	10377	Thu
##	230	1978-08-18	10355	Fri
##	231	1978-08-19	8904	Sat
##	232	1978-08-20	8477	Sun
##	233	1978-08-21	9967	Mon
##	234	1978-08-22	10229	Tue
##	235	1978-08-23	9900	Wed
##	236	1978-08-24	10152	Thu
##	237	1978-08-25	10173	Fri
##	238	1978-08-26	8782	Sat
##	239	1978-08-27	8453	Sun
##	240	1978-08-28	9998	Mon
##	241	1978-08-29	10387	Tue
##	242	1978-08-30	10063	Wed
##	243	1978-08-31	9849	Thu
##	244	1978-09-01	10114	Fri
##	245	1978-09-02	8580	Sat
##	246	1978-09-03	8355	Sun
##	247	1978-09-04	8481	Mon
##	248	1978-09-05	10023	Tue
##	249	1978-09-06	10703	Wed
##	250	1978-09-07	10292	Thu
##	251	1978-09-08	10371	Fri
##	252	1978-09-09	9023	Sat
##	253	1978-09-10	8630	Sun
##	254	1978-09-11	10154	Mon
##	255	1978-09-12	10425	Tue
##	256	1978-09-13	10149	Wed
##	257	1978-09-14	10265	Thu
##	258	1978-09-15	10265	Fri
##	259	1978-09-16	9170	Sat
##	260	1978-09-17	8711	Sun
##	261	1978-09-18	10304	Mon
##	262	1978-09-19	10711	Tue
##	263	1978-09-20	10488	Wed
##	264	1978-09-21	10499	Thu
##	265	1978-09-22	10349	Fri
##	266	1978-09-23	8735	Sat
##	267	1978-09-24	8647	Sun
##	268	1978-09-25	10414	Mon
##	269	1978-09-26	10498	Tue

##	270	1978-09-27	10344	Wed
##	271	1978-09-28	10175	Thu
##	272	1978-09-29	10368	Fri
##	273	1978-09-30	8648	Sat
##	274	1978-10-01	8686	Sun
##	275	1978-10-02	9927	Mon
##	276	1978-10-03	10378	Tue
##	277	1978-10-04	9928	Wed
##	278	1978-10-05	9949	Thu
##	279	1978-10-06	10052	Fri
##	280	1978-10-07	8605	Sat
##	281	1978-10-08	8377	Sun
##	282	1978-10-09	9765	Mon
##	283	1978-10-10	10351	Tue
##	284	1978-10-11	9873	Wed
##	285	1978-10-12	9824	Thu
##	286	1978-10-13	9755	Fri
##	287	1978-10-14	8554	Sat
##	288	1978-10-15	7873	Sun
##	289	1978-10-16	9531	Mon
##	290	1978-10-17	9938	Tue
##	291	1978-10-18	9388	Wed
##	292	1978-10-19	9502	Thu
##	293	1978-10-20	9625	Fri
##	294	1978-10-21	8411	Sat
##	295	1978-10-22	7936	Sun
##	296	1978-10-23	9425	Mon
##	297	1978-10-24	9576	Tue
##	298	1978-10-25	9328	Wed
##	299	1978-10-26	9501	Thu
##	300	1978-10-27	9537	Fri
##	301	1978-10-28	8415	Sat
##	302	1978-10-29	8155	Sun
##	303	1978-10-30	9457	Mon
##	304	1978-10-31	9333	Tue
##	305	1978-11-01	9321	Wed
##	306	1978-11-02	9245	Thu
##	307	1978-11-03	9774	Fri
##	308	1978-11-04	8246	Sat
##	309	1978-11-05	8011	Sun
##	310	1978-11-06	9507	Mon
##	311	1978-11-07	9769	Tue
##	312	1978-11-08	9501	Wed
##	313	1978-11-09	9609	Thu
##	314	1978-11-10	9652	Fri
##	315	1978-11-11	8352	Sat
##	316	1978-11-12	7967	Sun
##	317	1978-11-13	9606	Mon
##	318	1978-11-14	10014	Tue
##	319	1978-11-15	9536	Wed
##	320	1978-11-16	9568	Thu
##	321	1978-11-17	9835	Fri
##	322	1978-11-18	8432	Sat
##	323	1978-11-19	7868	Sun

```
## 324 1978-11-20 9592 Mon
## 325 1978-11-21 9950 Tue
## 326 1978-11-22 9548 Wed
## 327 1978-11-23 7915 Thu
## 328 1978-11-24 9037 Fri
## 329 1978-11-25 8275 Sat
## 330 1978-11-26 8068 Sun
## 331 1978-11-27 9825 Mon
## 332 1978-11-28 9814 Tue
## 333 1978-11-29 9438 Wed
## 334 1978-11-30 9396 Thu
## 335 1978-12-01 9592 Fri
## 336 1978-12-02 8528 Sat
## 337 1978-12-03 8196 Sun
## 338 1978-12-04 9767 Mon
## 339 1978-12-05 9881 Tue
## 340 1978-12-06 9402 Wed
## 341 1978-12-07 9480 Thu
## 342 1978-12-08 9398 Fri
## 343 1978-12-09 8335 Sat
## 344 1978-12-10 8093 Sun
## 345 1978-12-11 9686 Mon
## 346 1978-12-12 10063 Tue
## 347 1978-12-13 9509 Wed
## 348 1978-12-14 9524 Thu
## 349 1978-12-15 9951 Fri
## 350 1978-12-16 8507 Sat
## 351 1978-12-17 8172 Sun
## 352 1978-12-18 10196 Mon
## 353 1978-12-19 10605 Tue
## 354 1978-12-20 9998 Wed
## 355 1978-12-21 9398 Thu
## 356 1978-12-22 9008 Fri
## 357 1978-12-23 7939 Sat
## 358 1978-12-24 7964 Sun
## 359 1978-12-25 7846 Mon
## 360 1978-12-26 8902 Tue
## 361 1978-12-27 9907 Wed
## 362 1978-12-28 10177 Thu
## 363 1978-12-29 10401 Fri
## 364 1978-12-30 8474 Sat
## 365 1978-12-31 8028 Sun
```

d. Plot the data with the point color being determined by the day of the week variable.

#The space between clusters in each month is because there are less births on the weekend (Saturday/Sunday) than during the week.

```
Births78 %>%
  ggplot(aes(x=date, y=births)) +
  geom_point(aes(color=dow))
```

